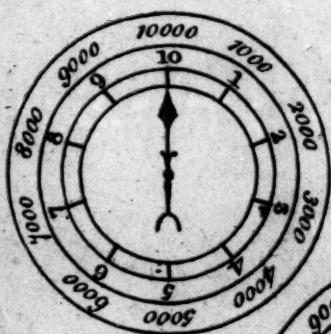
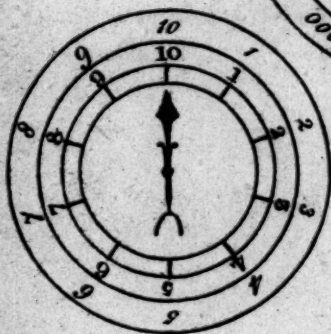
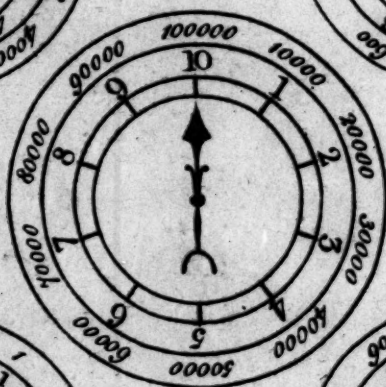
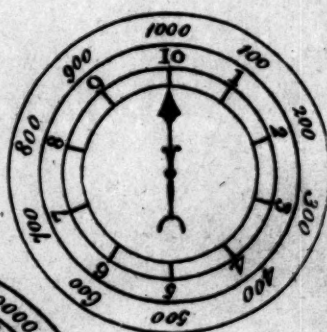


# *The Chronometer.*

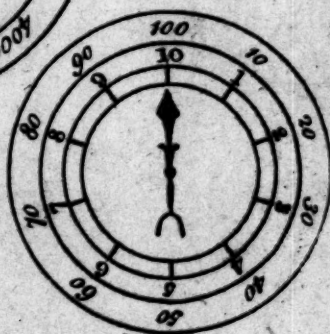
A



R



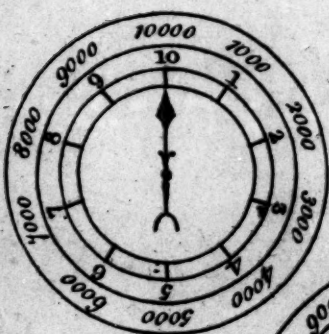
P



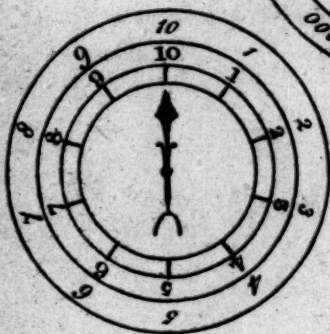
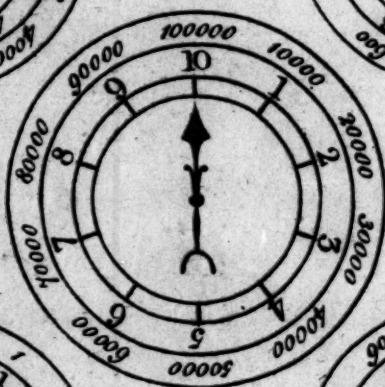
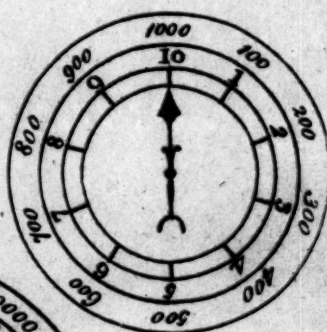
I

# *The Chronometer.*

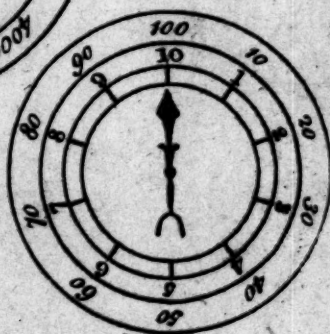
A



R



P



I

7776  
531.d.33  
6

# PANTOMETRY;

OR,

## AN ATTEMPT TO SYSTEMATIZE

EVERY BRANCH OF

# ADMEASUREMENT.

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By JOHN DAWES, SURGEON. *K*

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LONDON:

Printed for the AUTHOR, by W. GLENDINNING, No. 9,  
Charles Street, Hatton Garden; and Sold by Mr. PEARSON,  
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# PANTOMETRY.

THE intent of this system is to lay before the reader a clear and comprehensive plan of universal admeasurement, united in a regular concatenation of parts, and subjected to one common principle.

All calculations of time will serve, without alteration, for those of motion, *et vice versa*: many of the present tables will be rendered useless: computations of weights, measures, &c. will be performed as easily as common decimal arithmetic: and every calculation made with great facility and expedition.

The circle is the fundamental principle of this treatise, upon which foundation, the following subjects are considered and arranged in the subsequent order:

Cyclometry	-	-	c	ΚύκλⓄ	the circle
Chronometry	-	-	x	ΧρόνⓄ	Time
Grammometry	-	-	g	Γραμμ'η	Lines, &c.
Tetragonometry	-	-	t	ΤετραγώνⓄ	Land, &c.
Cubometry	-	-	k	ΚύβⓄ	the cube
Hydrometry	-	-	u	Υδωρ	Liquids
Barometry	-	-	b	ΒάρⓄ	Weights
Numismatometry	-	-	n	Νόμισμα	Coin
Arithmometry	-	-		ΑριθμⓄ	Numbers

N. B. Μετρον terminates every name in this Pantometry.

Notwithstanding the names of quantities in the arithmetical Nomenclature at present in use are so numerous, yet, in this system, as differing from it in many respects, other names, descriptive of their own meaning, become absolutely necessary, and in selecting those names, brevity has been consulted as much as possible without destroying perspicuity : in this work they are confined to eleven, which are arranged in the following Pantometrical Table \*, which will serve every measure.

## THE PANTOMETRICAL TABLE.

[illegible]

\* The exponent, index, or figure over the numbers in this Table, signifies, that the digit 1, is followed by so many cyphers; or that the common number 10 is raised to the power exprelled by the said exponent.

† *Ελακτις* is, in the Greek Language, applied both to number and quantity, and it is to be observed, that I use the word *Elachistometer* for the least portion of time, &c. which I have occasion to consider.

## CYCLOMETRY.

Let the circle be divided into  $10^5$  (a hundred thousand) equal parts or protometers, ten of which will make a decameter, &c. see the foregoing pantometrical table.

## CHRONOMETRY.

Let a clock (or chronometer) be so constructed, that its pendulum shall make an hundred thousand oscillations during the time in which the earth revolves once about its axis, and, on the dial plate, let five circles be described (each divided into ten equal parts) which may be named according to their indications, as (*e. g.*) the central circle should be called Myriometer, because its index points out the Myriometers in a day: the characters are affixed to the other circles, as in the annexed figure.

## GRAMMOMETRY.

Let the greatest (*viz.* the equatorial) perimeter of the earth be divided, by supposition, into an hundred thousand equal parts (or protometers), and let each of these protometers be again divided into a thousand equal parts which will be chilioftometers, now one of the last divisions may be exactly measured thus,

Let



Let the pendulum\* of the aforesaid chronometer be divided into 1839236 equal parts: so that the length of 1000000 of those divisions will make a chiliostometer exactly; this is known by the following operation,

Put  $a$  = the number of vibrations of the pendulum oscillating seconds,

$b$  = its length in inches,

$c$  = the number of vibrations of the pend. oscillating protometers,

$d$  = the equatorial perimeter of the earth in inches,

$e$  = the same in protometers,

Now  $a : b :: c : \frac{a \cdot b}{c}$  = the length in inches of the pendulum oscillating protometers, and  $d : \frac{a \cdot b}{c} :: e : \frac{a \cdot b \cdot e}{c \cdot d}$  = the number of equal parts into which it is to be divided; but  $e$  and  $c$ , being equal, destroy each other, hence  $\frac{a \cdot b}{c \cdot d} = .001839236$  protometer, or 1.839236 chiliostometer, as before.

The following table will shew the lengths and divisions of pendula in every five degrees of latitude.

\* From the point of suspension to the center of oscillation when it can be truly ascertained.

Latitude

Latitude.	Length of the Pend. vibrating seconds in inches.	Length of the Pendulum vib. Protometers in inches.	Each Pendulum to be divided into
0	39.027	29.133499392	18392361
5	— .029	— .134992384	— 93303
10	— .032	— .137231872	— 94717
15	— .036	— .140217856	— 96602
20	— .044	— .146189824	18400372
25	— .057	— .155894272	— 06498
30	— .070	— .165598721	— 12625
35	— .084	— .176049664	— 19223
40	— .097	— .185754112	— 25849
45	— .111	— .196205056	— 31947
50	— .126	— .207402496	— 39016
51½	— .128	— .208895488	— 39956
55	— .142	— .219346432	— 46557
60	— .158	— .231290368	— 54097
65	— .168	— .238755328	— 58816
70	— .177	— .245473792	— 63051
75	— .185	— .251445761	— 66821
80	— .191	— .256924736	— 69649
85	— .195	— .258910722	— 71534
90	— .197	— .260403712	— 72477

equal parts.

## TETRAGONOMETRY.

Let the square of the Elachistometer be increased in a decimo-arithmetical ratio to the Myriostometer.

## CUBOMETRY.

Let the cube of the Elachistometer be increased in a decimo-arithmetical ratio to the Myriostometer.

## HYDROME.

## HYDROMETRY.

Let vessels, for the purposes of measuring all kinds of *fluids*, have those (internal) dimensions which are expressed under Cubometry.

☞ The dimensions of a vessel will also be the quantity of fluid it will contain, and moreover, according to its gravity, the weight of the same.

## BAROMETRY.

Let the weight of that quantity of common clear water, which can be contained in each of the aforesaid vessels, be used for the purposes of measuring every thing that is valued by weights.

## NUMISMATOMETRY.

Let the aforesaid weights of sterling silver be the current pieces of coin.

## ARITHMOMETRY.

Let ten pieces or things be called decameter, an hundred, hecatometer. See the table of comparative values.

Because the same names of quantities are applied to every subject in this Pantometry, it will, perhaps in some cases, be necessary, that a reciprocal distinction should be made for each subject; which is done by the following

*Rule*

Affix the character of the subject to the character of the quantity, (*e. g.*).

$$\left. \begin{array}{l} E^b \\ P^x \\ R^n \end{array} \right\} \text{which signify} \left\{ \begin{array}{l} \text{an Elachistometer of weight} \\ \text{a protometer of time} \\ \text{a hecatometer of money} \end{array} \right.$$

NUMERA-



## NUMERATION.

That figure on the left side of the separatrix is the unit's place of the character or name affixt.

## REDUCTION.

This is performed by removing the separatrix, viz: to the finifter side, if ascending; to the dexter, if descending.

*Example in Reduction ascending.*

Reduce 26588 H to D, P, I, R each retaining the same value, then 2658·8 D, 265·88 P, 26·588 I, 2·6588 R are equal to each other.

*Example in Reduction descending.*

Reduce 2·6588 R to I, P, D, H each retaining the same value, then 26·588 I, 265·88 P, 2658·8 D, 26588 H are equal to each other.

Addition, Subtraction, Multiplication and Division, are performed in the same manner as decimal arithmetic.

*A Rule for operations in Tetragonometry, Cubometry and Hydrometry.*

Reduce all measures of length to Elacbistometers, which is easily done by the Pantometrical Table.

*An example in each.*

There is a field in the form of a trapezium, one of whose diagonals is 4 D, the perpendicular drawn to it from one of the other angles is 1·2 D, the other is 9 H, Query the content.

Operation

Operation, By the rule  $4 D = 40000 E$ ,  $1.2 D = 12000 E$ , and  $6 H = 9000 E$ , then  $\frac{12000 + 9000}{2} \times 40000 = 420000000 E$  or, by reduction,  $4.2 A$ .

There is a regular solid whose length is  $1.4 C$ , width  $9M$  and depth  $4M$ , Query the content?

By the rule  $1.4 C = 140 E$ ,  $9 M = 90 E$ ,  $4 M = 40 E$ . Then  $140 \times 90 \times 40 = 504000 E$  or, by reduction,  $5.04 P$ .

There is a cylindrical vessel whose diameter is  $7 M$ , and depth  $1.3 C$ ; required the internal dimensions?

By the rule  $7 M = 70 E$ , and  $1.3 C = 130 E$ , then  $70^2 \times 130 = 500299.8 E$  or, by reduction,  $5.002998 P$ .

### ASTRONOMY.

If the sun's diurnal motion in Longitude, be  $2.6588R$ : what is his motion in a protometer of time?

Say as  $1 \odot (10^5 P) : 2.6588R :: 1P : \frac{2.6588}{10^5} = .000026588R$  or, by reduction,  $2.6588C$

or as  $10^5 : 26588H :: 1 : .26588H$  or  $2.6588C$

The following Table, is a page of the Nautical Almanack, put into this measure, with the addition of the sun's diurnal motion in longitude, by which mean, his motion, in any decimal portion of time, will be shewn by the same figures.

JUNE

Days of the week  
Th  
F  
S  
Su  
M  
T  
W  
Th  
F  
S  
Su  
M  
T  
W  
Th  
F  
S  
Su  
M  
T  
W  
Th  
F  
S  
Su  
M  
T  
W  
Th  
F

( 11 )  
JUNE 1797.

Days of the week — of the month		The SUN's				Equat. sub.	Diff.
		Longitude	Differ.	Rt. Ascen.	Decl. no.		
		I	R	I	A	R	I
Th	1	1° 982176	2° 6588	1° 939120	6° 15756	1° 749	1° 09
F	2	2° 008764	- 75	- 67580	- 9321	640	1° 12
S	3	- 35339	- 66	- 96088	6° 22700	528	6
Su	4	- 61905	- 59	2° 024629	- 5903	412	9
M	5	- 88464	- 44	- 53206	- 8928	293	1° 21
T	6	2° 115008	- 43	- 81805	6° 31767	° 172	7
W	7	- 41551	- 36	2° 110451	- 4431	° 045	1° 30
Th	8	- 68087	- 27	- 39131	- 6890	0° 915	2
F	9	- 94614	- 20	- 67824	- 9166	° 783	5
S	10	2° 221134	- 20	- 96574	6° 41265	° 648	8
Su	11	— 47654	- 12	2° 225335	- 3171	° 510	1° 40
M	12	— 74166	- 13	- 54120	- 4892	° 370	2
T	13	2° 300679	- 05	- 82917	- 6420	° 228	5
W	14	— 27184	- 11	2° 311748	- 7762	° 083	6
Th	15	— 53695	- 05	- 40590	- 8912	add. 063	6
F	16	- 80200	- 05	- 69444	- 9869	° 209	9
S	17	2° 406705	- 04	- 98310	6° 50640	° 358	1° 50
Su	18	- 33209	- 05	2° 427199	- 1219	° 508	0
M	19	- 59714	- 03	- 56076	- 1605	° 659	0
Tu	20	- 86217	- 00	- 84977	- 1798	° 809	2
W	21	2° 512717	- 04	2° 513865	- 1806	° 961	0
Th	22	- 39221	- 04	- 42755	- 1613	1° 111	0
F	23	- 65725	2° 6497	- 71643	- 1234	° 261	1° 49
S	24	- 92222	- 98	2° 600521	- 0663	° 410	8
Su	25	2° 618719	- 96	- 29375	6° 49907	° 558	7
M	26	- 45217	- 89	- 58229	- 8951	° 705	4
T	27	- 71713	- 89	- 87060	- 7809	° 849	3
W	28	- 98202	- 89	2° 715868	- 6481	° 992	0
Th	29	2° 724691	- 86	- 44642	- 4961	° 132	1° 37
F	30	- 51180		- 73403	- 3248	° 269	





## 3

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[illegible]

# THIS TABLE SHEWS T

CYCLOMETRY.										CHRONOMETRY.										GRAMMOMETRY		TETRAGONOMETRY.		CUBOMETRY.							
Degrees.										Hours.										Inches.		Inches.		Square Inches.		Square Inches.		Cube Inches.		Cube Inches.	
of one of the	E	.000000036=	27	59	36	57	36	.0000000024=	1	51	58	27	50	24	.1584	-	=	.1584	.02509056	=	.02509056	.003974344704=	.003974344704								
	M	.000000036=	4	39	56	9	36	.000000024=	18	39	44	38	24	-	1.584	-	=	1.584	.2509056	=	.2509056	.03974344704=	.03974344704								
	C	.00000036=	46	39	21	36	-	.00000024=	3	6	37	26	24	-	15.84	-	=	1.32 f.	2.509056	=	2.509056	.3974344704=	.3974344704								
	H	.000036=	7	46	33	36	-	.0000024=	31	6	14	24	-	-	158.4	-	=	4.4 y.	25.09056	=	25.09056	3.974344704=	3.974344704								
	D	.00036=	1	17	45	36	-	.000024=	5	11	24	-	-	-	1584	-	=	8 per.	250.9056	=	1.7424 foot	39.74344704=	39.74344704								
	P	.0036=	12	57	36	-	-	.00024=	51	50	24	-	-	-	15840	-	=	2 furl.	2509.056	=	1.936 yards	397.4344704=	.23 feet								
	I	.036=	2	9	36	-	-	.0024=	8	33	24	-	-	-	158400	-	=	2.5 m.	25090.56	=	19.36 —	3974.344704=	2.3 —								
	R	.36=	21	36	-	-	-	.024=	1	26	24	-	-	-	1584000	=	25	-	250905.6	=	6.4 per	39743.44704=	23 —								
	A	3.6=	3	36	-	-	-	.24=	14	24	-	-	-	-	15840000	=	250	-	2509056	=	1.6 rood	397434.4704=	8.52 yards								
	I	36=	36	-	-	-	-	2.4=	2	24	-	-	-	-	158400000	=	36deg	-	25090560	=	4 acres	3974344.704=	85.2 —								
⊙	360=	360	-	-	-	-	24=	24	or 1 day.	-	-	-	-	1584000000	=	360°	-	-	-	-	-	-									



# THE COMPARATIVE VALUES

## HYDROMETRY.

## BAROMETRY.

## NUMISMATOMETRY.

## ARITHMOMETRY.

Wine measure. Ale measure, Pint. Dry measure, Pint.			Grains.	Avoird. wt.	Apoth. wt.	Shillings.	Penny.	£.	s.	d.	
01761787392 3	00011274737	00011828407	1006236	1006236 gr.	1006236 gr.	01083139	1299767	0	0	0½	
1761787392	0011274737	0011828407	1006236	10.06236	503118 ð	1083139	1299767	0	0	1½	0001
1761787392	011274737	011828407	1006236	3.679949 3	167706 3	1083139	1083139 s.	0	1	1	001
220223424 3	11274737	11828407	1006236	2.299968 3	2096325 3	1083139	1083139	0	10	10	01
13763964 lb	11274737	11828407	1006236	143748 lb	17469375 lb	1083139	5415695 £.	5	8	3½	1
17204955 gall.	14093421 gall.	14785509 gall.	1006236	143748	17469375	1083139	5415695	54	3	1½	1
17204955	17616776 firr.	18481886 bush.	1006236	1283464 cwt.	17469375 cwt.	1083139	5415695	541	11	4½	10
27309453 hogsh.	2936129 hogsh.	23102357 qr.	10062360	1283464	17469375	1083139	5415695	5415	13	10½	100
13654726 pipes	14680647 butts	57755892 chald.	100623600	6417321 tons	87346875 tons	1083139	5415695	54156	19	0	1000
68273633 tuns	14680647	23102357 lafts	1006236000	6417321	87346875	10831390	5415695	541569	10	0	10000